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THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

Application of Industrial Engineering Techniques to Reduce Workers' Compensation and Environmental Costs - Deliverable G

U.S. DEPARTMENT OF THE NAVY
CARDEROCK DIVISION,
NAVAL SURFACE WARFARE CENTER

in cooperation with
National Steel and Shipbuilding Company
San Diego, California

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DELIVERABLE G

IMPLEMENTATION OF BEHAVIOR BASED SAFETY PROCESS IN ASSEMBLY AREA

NATIONAL SHIPBUILDING RESEARCH PROGRAM

PANEL SP-8

PROJECT 8-96-3

DELIVERABLE G

IMPLEMENTATION OF BEHAVIOR BASED SAFETY PROCESS IN ASSEMBLY AREA

SUBMITTED BY

NATIONAL STEEL AND SHIPBUILDING COMPANY

TOM FAWCETT	**FREDDIE HOGAN**
PROJECT MANAGER	**PROJECT ENGINEER**

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SECTION I

Development of a Behavior-Based Injury Prevention Program

Each year medical claims and lost time injuries as a result of on-the- job accidents cost American companies millions of dollars. Most companies have implemented numerous diversified safety training programs and policies in an attempt to reduce the number of accident related injuries. The focus of many of these programs has been global in nature, and their effectiveness is difficult to monitor and measure. Results of evaluations of conducted among health and safety training practitioners indicate that it is generally not possible to determine if health and safety training are effective (Vojtecky & Schmitz, 1986.)

The problem is contemporary safety programs focus primarily on generic safety concerns without concentrating on specific areas of consideration and individual tasks performed by workers. Improvements in equipment, tools and personal protection gear may be one solution to the problem of escalating injury related expenses. Alternatively, implementation of training specifically designed to minimize at-risk behavior in areas where such behavior is most prevalent may be beneficial.

The industrial manufacturing and heavy industry working environment is not inherently safe; therefore safety precautions are essential. Components of a complete safety program include worker attitudes and skills, protective equipment, tools, workplace written policy, safety committee or department, and safety training. Safety training alone does not constitute a complete safety program; however, safety training is a critical element affecting other components, and in order for a safety program to be effective, all elements of the safety program must be in place. This report focuses on the development of a behavior-based safety process designed to identify at-risk behaviors and prevent injuries.

Background

The Rand Institute in Washington D.C. estimates costs associated with on-the-job accident-related injuries to be $82 billion per year (Saccaro, 1994, p.13). Although the costs attributed to Occupational Safety and Health Administration (OSHA) fines have increased, they are an insignificant portion of the total cost of accidents to American industry. Accident related injuries have many sources, and the total cost of these injuries is often difficult to realize. Costs associated with worker's compensation, worker morale, and medical/lost time claims all contribute to the total cost of accident-related injuries.

Workers' compensation is the government-mandated insurance program that provides reimbursement to injured workers. Costs associated with worker's compensation are the leading reason for businesses to move out of the U.S. (Saccaro, 1994). However, worker's compensation costs are only a small part of the true costs of accident-related injuries to a company. Other costs such as reduced productivity, training and salaries for replacement

workers, possible lawsuits, and decreased morale also exist and are difficult to quantify. The effect of accidents and injuries on worker morale is perhaps the most difficult cost to accurately measure. When a worker's attitude is changed because of an on-the-job injury, the cost to a company is impossible to gauge. This cost is multiplied by the effect such negative attitude has on the morale of co-workers.

Corporate safety programs

Corporate America in general and shipyards specifically do not have to accept injuries as inevitable because of accidents in the workplace. A combination of regulatory impact, business incentives, and labor incentives have stimulated implementation of safety programs over the past two decades. The U.S. Bureau of Labor Statistics reports that since 1978 the number of fatalities per 100,000 full-time workers has decreased by 50 percent, from 9.8 to 4.3 (Saccaro, 1994, pg.21) thus indicating that occupational safety programs and training do work. Presently the U.S. is faced with the challenge to prove that we can operate as efficiently as other nations where worker safety and health are emphasized as highly. With the support of government, unions, and insurance companies, enlightened management understands the true costs of doing business and has the opportunity to make the correct ethical decision with respect to worker safety.

To prevent accident-related injuries, corporate safety programs must focus on both the workforce and the workplace. Successful safety programs integrate the fundamentals of safe conditions and safe behaviors. Safety practitioners often refer to the "safety hierarchy" in their approach to accident prevention. The safety hierarchy is not the result of a research base, but is a product of the experience of safety professionals and organizations, and can be represented as follows (Barnett & Brickman, 1986):

1st priority:	Eliminate hazard or risk
2nd priority:	Apply safe-guarding technology
3rd priority:	Use warning signs
4th priority:	Train and instruct
5th priority:	Prescribe personal protection

The safety hierarchy described herein is generally used as a rule of thumb because not all the approaches listed are feasible for all circumstances. improvements in corporate safety are generally categorized into the following five groups:

1. *Behavior-Based Training* -- An organizational development model that uses training and implementation to identify behavior, measure performance, give feedback, and identify new behavior (Krause, Hidley, & Hodson, 1990).

2. *Ergonomic* (equipment and body position) -- An approach to safety which deals with the science of the problems related to fitting a man's anatomical, physiological,

and psychological characteristics in such a way as to enhance human efficiency as well being (Taber's Medical Dictionary).

3. *Managerial* -- Includes safety and safety training as a part of your business. Takes into consideration product quality, schedule efficiency, and production costs, and how these aspects can be improved by proper safety training. Effectively manages all aspects of injuries including lost time, worker's compensation, and medical claims.

4. *TQM* (Team based) -- The formation, organization and effective use of process improvement teams to analyze specific safety concerns, and suggest solutions and plans for implementation. A healthy workplace is likely to be a quality workplace. Many companies have initiated quality management programs, and safety is an important component in any quality program. A safe working environment contributes to the attitudes and behaviors that lead to quality goods and services. Methods that are commonly used to improve quality can also be applied to improve safety as well (Saccaro, 1994).

5. *Environment* -- A safety program which makes improvements to the physical conditions of the workplace including housekeeping, engineering controls, and other methods to remove unsafe conditions.

The "safety hierarchy" and general safety categories outlined do not always represent a single-measure approach. Often, two or more elements of accident prevention must be implemented to reduce injuries. The decision to take an active role in the prevention of injuries by monitoring safety and reducing hazards is an important first step, however selection of the proper safety program is the key element to success (Barnett, & Brickman, 1986).

Selecting An Effective Safety Program: A Case For Behavior-Based Training

Although safety awareness may eliminate some of the hazards faced by workers, safety awareness alone cannot eliminate all risk in the workplace. Effective techniques must be used to influence employees to avoid unsafe behavior. Peters (1991, p.53) outlined several strategies for encouraging employee self-protection such as: incentives, disciplinary actions, fear messages, and behavior modeling. However, because of issues concerning cost, resources, effectiveness, and attitudes, Peters (1991, p.69) states that most managers are unclear as to which of the strategies to implement.

The use of behavioral modeling through observation and feedback techniques has been shown to be an effective approach to safety. Chhokar and Wallin (1984) studied the behavioral safety performance of employees in an industrial plant by use of an observation instrument. The instrument included 35

specifically identified key behaviors, and the applied behavior package consisted of training, goal setting, and feedback. The results of the study confirmed the applicability of a behavior-based approach to safety. The approach suggested by Chhokar and Wallin (1984) identified specific behaviors that represent the safe way to perform required tasks, trained employees in these methods, and used periodic monitoring and feedback to enhance safety. Significant levels of improvement were reached only when training was combined with feedback. They concluded that a behavior-based approach seemed to be an effective alternative to the use of disciplinary actions, incentives, or fear messages.

The role of behavior observation, feedback and intervention

Cohen and Jensen (1984) used a behavior-sampling approach to develop and evaluate a safety training program focused on reducing unsafe conditions associated with lift truck operators in a warehouse. The study concluded that a well designed and administered occupational safety training program, emphasizing safe work practices derived from a true assessment of need, can be effective in improving on-the-job behavior. The study also showed enduring positive effects of the training program and indicated that these effects can be attributed to changes in work habits due to continued practice in safe work procedures.

Additionally, the use of performance feedback is a simple, effective, and durable method for promoting safety in other industries. For example, Fellner and Sulzer-Arnold (1984) studied the effects of posted feedback for improving safety in a paper mill. The posted feedback reflected safe and unsafe practices and conditions common to the workers employed at the mill. Also, injury and accident data were posted monthly. The study found that human motivation based on antecedents and consequences, such as performance feedback, is an effective way to reduce accident related injuries.

Behavioral observation and feedback alone are often not enough to enhance safety; a complete safety training program must also include some form of intervention. A study done at a shipyard in Helsinki, Finland showed a decrease of 20 percent in accident-related injuries by use of an intervention program. Thirteen small groups with a total of 97 members were employed in the intervention program focused on enhancing safety by improving housekeeping. The groups used training, frequent monitoring, and feedback of results, all elements of behavior modification technique. The departments that noticed the largest improvement were those departments in which the small groups worked actively and succeeded in involving other personnel in the program (Saarela, 1990).

Additionally, another study of an intervention program at the same shipyard in Helsinki, Finland in 1984 used a poster campaign as a means of intervention to reduce the number of injuries associated with the use of scaffolds (Saarela, 1989). The objective of the study was to determine if the safety consciousness among workers

could be enhanced by negative feedback. The focus of such campaigns is on the cognitive processes and motivation, and the influence they have on workers. The campaign seemed to have been effective in assisting workers to identify and control hazards by raising their hazard consciousness. However, other studies have shown that informational safety campaigns alone are seldom strong enough to lead to outstanding improvements in safety (Colver, Hutchinson & Judsen, 1982).

Safety Training Program

The ultimate goal of any safety training program is to create an environment in which workers are neither injured nor made ill by the work they perform. Competent workers are those workers possessing skills, attitudes, and knowledge to perform their work properly; these workers are likely to be safe workers. Competency training should be considered an important part of a safety training program. A comprehensive safety training program affects both the worker (skills, attitudes, and knowledge) and the workplace (administrative controls, engineering controls, workstation design, and protective equipment).

Management considers a training program that provides effective safety and health training a profit center. However, justifying the cost of safety training is an administrative, not a developmental concern; therefore, cost justification is not usually considered in the development of a safety training program. Industry generally accepts that examination of safety training on a cost-benefit analysis basis can easily justify implementation of a safety training program (Saccaro, 1994).

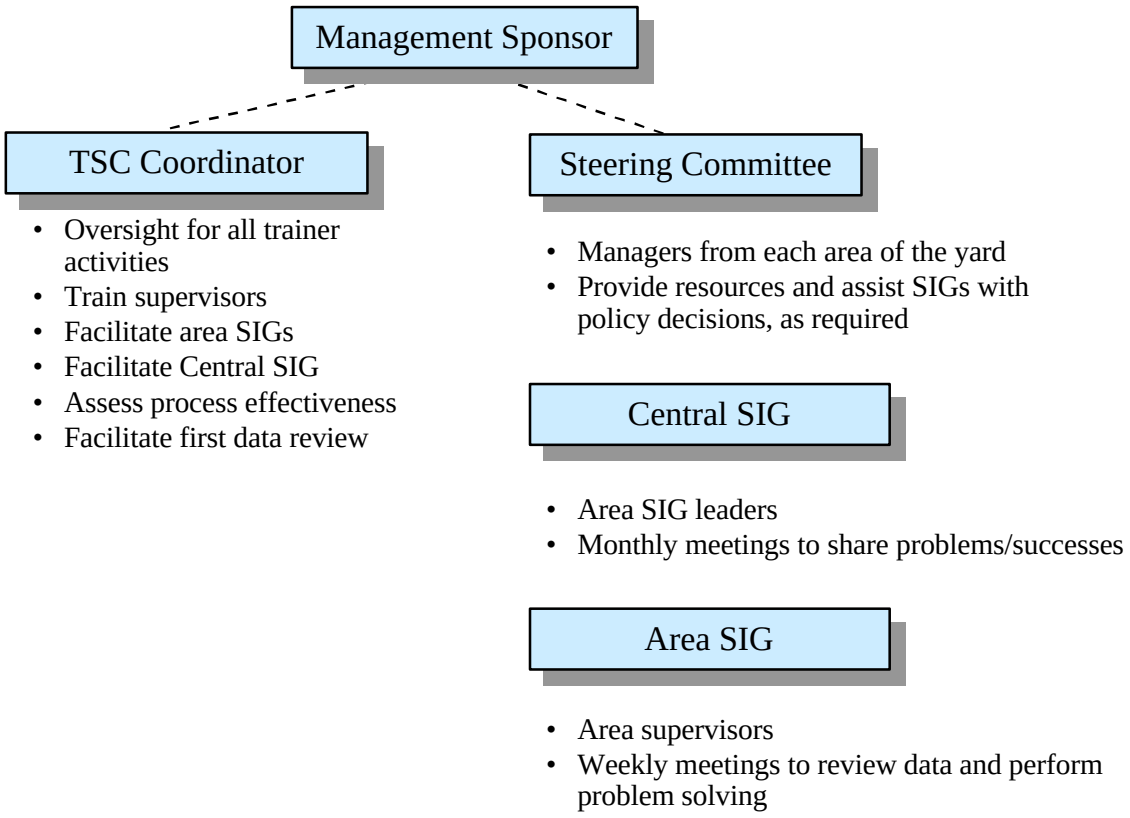
Although safety training programs may never result in a completely risk-free environment, a risk-free workplace is the rationale for the existence of safety training and is the goal toward which safety training is directed. If safety training programs cannot eliminate risk, they can go far to reduce risk. There is no justification for workers to leave the job at the end of the day physically injured, emotionally dysfunctional, or predisposed to illness.

SECTION Ic

NASSCO'S APPROACH

NASSCO has embraced the philosophies of Behavior Based Safety and adopted this model of organization change, calling our process, Total Safety Culture, or TSC. In order to provide the necessary support for any organizational change initiative, the proper infrastructure is essential. As groups complete their training and begin the observation and feedback process, a well-designed support system can provide the requisite resources and reinforcement vital to their continued success.

To achieve the Total Safety Culture change which has been undertaken at NASSCO, the following organizational support infrastructure was implemented:



Site Implementation Groups

Site Implementation Groups were created in each area of the yard as the TSC training reached their area. The SIG structure was very similar to a PIT team, in that the leader, recorder, scribe, timekeeper were selected in the group. The group itself is comprised of supervisors from that area who can serve as role models and TSC champions for their area. Each SIG meets weekly to assess their area's progress. Their review includes analyzing the data collected from the observation process, looking for trends and patterns, as well as taking action on at-risk items referred to them by the observing supervisors. The SIGs are also tasked with conveying information about the TSC observation process results to the supervisors for use at their 5-minute meetings or other venues as deemed appropriate. SIG leaders report individual area progress to the department manager/Steering Committee member on an on-going basis. Steering Committee members bring issues specific to their area to the Steering Committee as needed.

The SIGs are an integral part of the TSC process. As such, it is essential that they have the opportunity to learn from each

other. To accommodate that need, each SIG coordinator becomes a member of the Central SIG.

Central SIG

Area SIG Leaders meet monthly providing them an opportunity to learn from each other by sharing lessons learned and brainstorming suggestions for problem situations. The Central SIG serves as a clearinghouse for TSC best-practices throughout the yard, as well as providing a resource and support for each of the SIG members. The TSC Coordinator brings process or decision issues to the Steering committee for action and feedback.

Area SIG Sponsor

The Area SIG Sponsor is the department or area manager for each of the TSC areas. They provide on-going support and resources to their Area SIG. It is their responsibility to ensure on-going operational success of the TSC. They review, evaluate and approve recommendations from their Area SIG. They are members of the Steering Committee.

Steering Committee

The role of the Steering Committee in the TSC implementation is vital. They provide the managerial "clout" necessary to make needed policy and capital expenditure decisions that are beyond the scope of the Central SIG. The Steering Committee will report to the Management Sponsor.

Management Sponsors

The Management Sponsors are the Vice President of Production and Vice President of Finance. They will serve as champions for the yard-wide TSC process. The Steering Committee reports to them. They will provide necessary guidance and support for the Steering Committee, as well as serve as liaison with Executive Staff.

TSC Coordinator

The TSC Coordinator has overall responsibility for incorporation of the principles of behavior-based safety into NASSCO's culture. This responsibility will be implemented through facilitating the area SIGs, the Central SIG, and the Steering Committee. Additionally, the TSC Coordinator will have dotted line responsibility to the Management Sponsor. Additional Coordinator responsibilities include:

- Coordinating and implementing the strategic plan for TSC
- Developing training materials
- Delivering training to supervisors and employees
- Facilitating individual department's observation and feedback process
- Identifying additional training needed and working with Trades Training Coordinators to provide
- Monitoring the effectiveness of the ongoing training and implementation activities

The Coordinator position requires excellent communication, presentation and facilitation skills. Full knowledge of the principles of TSC, including behavioral psychology is essential, as well as the ability to make those concepts accessible by the supervisors and employees at NASSCO. Additionally, experience implementing cultural change initiatives is vital.

Training Roll-out

Training efforts began in the production areas of the yard, starting with the Assembly Area, the focus of this report.

SECTION IIA

Assembly Area Overview

The first area of the yard identified for implementation of TSC was the Assembly area. There are approximately 437 employees and 25 supervisors. Basically two trades function in this area, shipfitters and welders. The average number of years of service at NASSCO for supervisors is approximately 20. For hourly employees, the average is much less.

This is the area where A-2 units are assembled from pre-fabricated sub-units. The type of work activities performed in the Assembly area includes welding, burning, fitting, and grinding. The work is performed on "tables" or pin jigs of varying heights.

The supervisors play a key role in the success if TSC as they are the ones who conduct daily observations. The supervisor group as a whole in the Assembly area can be characterized as technically competent in their trade, but relatively unschooled in the art of management. As their years of service would indicate, resistance to change is high. Their management style could be described as "command and control."

SECTION IIB

Site Implementation Group

A Site Implementation Group (SIG) was created from among the supervisors. One supervisor from each of the tables was selected to serve on the committee. As the Assembly area has a sizable second shift, the SIG group includes three representatives from the second shift.

This group is chartered with managing the success of the TSC process in the Assembly area. The SIG meets weekly, reviews the observation sheets, and identifies and completes action items as indicated on the observation sheets.

Communication from the SIG is extremely important. Among their responsibilities is the need to communicate SIG actions to the other supervisors, as well as, the employees.

In addition to attending supervisor training as outlined below, SIG members attended an additional 16 hours of training on their role as implementers of TSC for their area. Part

of this training included the creation of the observation sheet which would be used in the Assembly area observation and feedback process. The observation sheet in included in the Appendix section.

SECTION IIC

Training

Training for TSC was designed for two specific audiences -- supervisors and employees. The supervisor training consisted of two 8-hour days. These sessions were held on Saturdays in order to allow all supervisors for the area to attend at once and not compromise production. These classes provided an in-depth look at behavior based safety, the role of the supervisor in a "Total Safety" culture, and skill practice and feedback in the observation and feedback process -- the "heart" of the TSC process at NASSCO. Supervisor training was completed prior to starting the employee sessions.

Employee training consisted of a 3 1/2-hour overview. Employees were taken off the job for essentially a half day. Their class covered the concepts of Total Safety, the observation and feedback process and provided the opportunity to experience a mock video-taped observation. Both supervisor and employee courses included the use of a video tape discussing the art of giving and receiving one-on-one feedback. Course outlines for both the supervisor and employee training follow:

SUPERVISOR TRAINING

SESSION I **Total Safety Culture Overview**

A. Define NASSCO's current safety culture
B. The elements of a Total Safety Culture
    1. The safety triangle
    2. Building safe habits
C. Understanding Motivation
D. Introduction to Observation and Feedback Process
E. Managing Change

SESSION II	**<u>Observation and Feedback Training</u>** A. Case Study using ABC model B. SIG presentation of customized observation sheet C. Video observation and feedback D. "One-on-One" Video and feedback role play E. Handling defensive attitudes F. The Supervisors' Role in a Total Safety Culture

EMPLOYEE TRAINING

SESSION I	**<u>Total Safety Culture Overview</u>** A. Understand the elements of a Total Safety Culture 1. The safety triangle 2. Building safe habits B. Understanding Motivation C. Observation and Feedback Process D. "One-on-One" Video E. The employee's role in a Total Safety Culture

SECTION IID

The Observation and Feedback Process

The backbone of the TSC process is the observation and feedback process. As previously stated, due to Union contract restraints, only salaried supervisors are able to participate in the observation and feedback process. As stated in SECTION IIIB, the area Site Implementation Group (SIG) designed the observation process for the Assembly area. The Assembly Observation Sheet was then used in the supervisor training to allow them the opportunity to familiarize themselves with the sheets and their use.

In addition to the observation sheet, a definition sheet was created which expanded on each of the items listed on the observation sheet. The definition sheet was to be used as a resource and training tool prior to conducting the observations. Only the observation sheet itself was designed to be taken to the job site and used during an observation. A copy of the definition sheet is included in the Appendices.

The observation process began upon completion by all employees of their overview training. The intention was that no employee would be

approached by a supervisor wanting to conduct an observation without having attended training. There is a perception among employees that a safety observation is just another way for the supervisor to evaluate or "grade down" an employee. This was one of the major discussion points during the employee overview training. Therefore, the manner in which the supervisor conducts the observation and feedback session can reinforce or overcome that misunderstanding.

Initially, the goal was for each supervisor to conduct two 10-minute observations daily. The completed observations were to be dropped into a locked drop box to be picked up and tallied by someone outside the department. This information was then referred to the SIG group for action.

SECTION III OUTCOMES

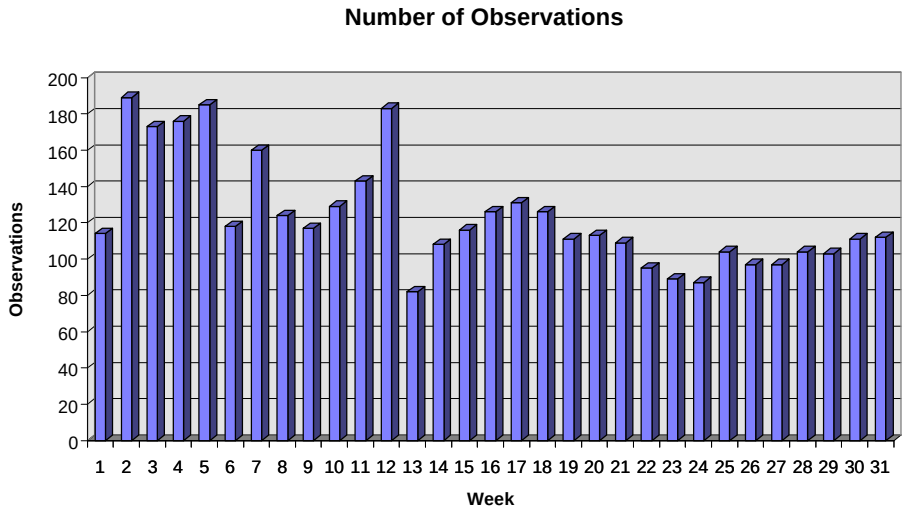
A. The Observation Process

The observation process began the first week in February, upon completion of both the supervisor and employee training. Initially, two 10-minute observations per day were required of all salaried supervisors. Compliance was slow and reluctant. Many supervisors did not perform the observations citing production demands. The SIG team tried to manage the process and conducted a problem solving session to determine the root causes of the lack of supervisor support for the TSC process with the following results:

- not enough time
- don't know how to fill out the sheet
- if they find at-risk conditions it just makes more work for them
- production schedules don't allow enough time
- it's just not a habit
- uncomfortable with paperwork in general
- observation sheet is too confusing

As a result of this brainstorming process, the SIG members started teaming up with other supervisors who were struggling with the observation process. This had a positive impact on the number and quality of observations being performed, for a while. It became apparent that the supervisors would perform better quality observations if they were asked to perform one observation daily, rather than two. In April the number of observations required was lowered to one a day. Many supervisors who were strong supporters of the TSC process continue to perform two observations daily.

The following chart shows the number of observations performed weekly since the beginning of the TSC process in the Assembly Area.



SECTION IIIB

SIG Actions

The SIG team was made up of supervisors representing the six different tables in the Assembly Area, plus three second shift representatives. As stated previously, the SIG team attended an additional 16 hours of training to understand their role and responsibilities in the TSC process. The team elected a leader, scribe and timekeeper.

The SIG team meets weekly for one hour. Their typical meeting agenda includes the following items:

- Review previous week's minutes
- Record action in open items
- Review the observation sheets
- Identify any new action items
- Discuss comments from observation sheets
- Problem solve issues that have come up in the previous week during production which may not be recorded on observation sheets

Each week, in addition to the observation sheets, the SIG reviews statistics which have been compiled from the previous week's sheets. Number of at-risk behaviors is tracked by line item on the observation sheets. The Pareto principle is used to identify "vital few" areas needing SIG attention. Sample SIG reports appear in the Appendix Section.

As the supervisors have struggled with completing the observation sheets, the SIG team has struggled with their role as managers of the TSC process. The area manager has had a difficult time letting go of control of issues which

should reside with the SIG; some SIG decisions have been reversed or second-guessed. As a result, the SIG team has been hesitant to make decisions and a feeling of inertia has developed.

In spite of these challenges, the SIG team has identified and resolved many safety action items. One of the first issues to be brought to the SIG's attention was ill-fitting safety glasses. The SIG team contacted several vendors who provided them with samples of different safety glasses. Groups of employees were brought in and tested for best fit. One type of glasses was selected for testing on one of the tables with the most eye injuries. The glasses were distributed to the employees who wore them for a period of two months. Data was collected using the following safety glasses checklist and a purchase decision was made as a result of the feedback.

BADGE	NAME	FIT Exc, Good, Poor	SCRATCH? Yes or No	FOG UP Yes or No	COMMENTS

SECTION IIIC

SUPERVISOR SURVEY

As part of their on-going management activities, the SIG team wished to determine the level of supervisor understanding and support for the TSC process. In August, a survey was conducted from among the supervisors with some surprising results. (Both survey and results are included in the Appendices.)

In brief, six months into the program, over 90% of the supervisors responding felt they had a good understanding of Total Safety Culture. When responding to a question of difficulty in performing daily observations, only 7.7% felt they had a hard time performing the desired number of observations. Additionally, almost 80% of the supervisors felt that employees were beginning to give each

other feedback about at-risk behaviors, one of the key elements of Total Safety Culture.

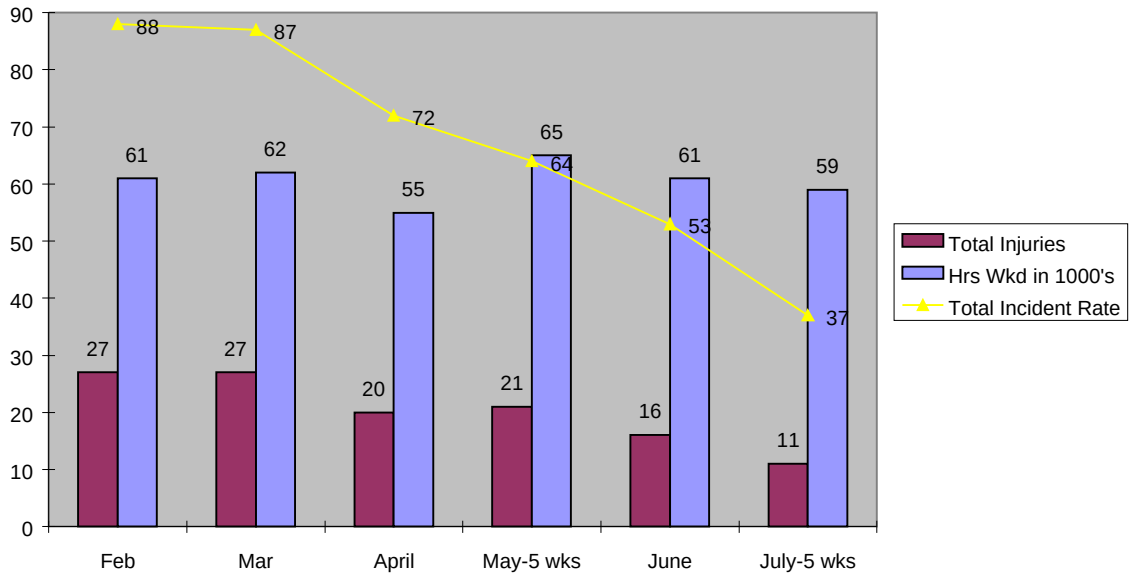
One key insight gained from the survey was that communication from the SIG team back to supervisors and employees was lacking. Several different remedies have been implemented, including wider distribution of the SIG minutes and more discussion of SIG actions at weekly safety meetings. This remains an area of concern for the SIG team.

SECTION IIID

IMPACT ON SAFETY

A key measure of success for any behavior-based safety initiative is the reduction in the number of accidents occurring in the workplace. While the literature warns that little to no improvement should be expected for the period of 12-18 months after implementation, immediate improvement was seen in NASSCO's Assembly Area. Incident rates dropped from 88 in February of 1998 to 37 at the end of the six month period covered in this report. Chart follows:

STEEL ASSEMBLY INJURY SUMMARY 1998



Section IV

SUMMARY

The ultimate goal of any safety training program is to create an environment in which workers are neither injured nor made ill by the work they perform. A comprehensive safety training program affects both the worker (skills, attitudes, and knowledge) and the workplace (administrative controls, engineering controls, workstation design, and protective equipment.)

Although safety training programs may never result in a completely risk-free environment, a risk-free workplace is the rationale for the existence of safety training and is the goal toward which safety training is directed. If safety training programs cannot eliminate risk, they can go far to reduce risk. Behavior-Based Safety Training provides an organizational development model that uses training and implementation to identify behavior, measure performance, give feedback, and identify new behavior.

The use of behavioral modeling through observation and feedback techniques has been shown to be an effective approach to safety. Behavioral observation and feedback alone are often not enough to enhance safety; a complete safety training program must also include some form of intervention. The approach adopted by NASSCO identified specific behaviors that represent the safe way to perform required tasks, trained employees in these methods, and used periodic observation and feedback to encourage employees to perform the tasks in the prescribed safe manner. Significant levels of improvement can be reached only when training is combined with feedback.

In NASSCO's Assembly Area, a behavior-based safety program, Total Safety Culture, involved comprehensive training in theory and practice for both supervisors and employees. Supervisors conducted observations and provided feedback to employees. Data collected during the observation process was analyzed and acted on by a Site Implementation Group tasked with the responsibility of implementing TSC in their area. At the end of the first six-month period, incident rates had dropped by a significant percent.

As in any major organization change intervention, long-term change is slow in coming. While the safety statistics reflect a favorable trend, much work remains to be done in building relationships of trust between employees and supervisors, and between supervisors and their manager. The Total Safety Culture infrastructure is designed to empower supervisors to take appropriate actions to assure the success of the process, as well as empower employees to provide feedback to each other in regards to unsafe behaviors. These are two of the core elements of behavior-based safety and will continue to drive NASSCO's efforts in the future.

SECTION V

APPENDICES

Assembly Area Observation Sheet

Assembly Area Definition Sheet

Sample SIG Reports

Supervisor Survey Report

❑ Observation Interrupted* ❑ SIG Follow-up

NASSCO ASSEMBLY OBSERVATION SHEET

Observer_____ Badge_____

Area ☐ T-1 ☐ T-2 ☐ T-3 ☐ T-4 ☐ T-8 ☐ T-9 ☐ T-11 ☐ On Block ☐ Other_____

TC_____Shift____Overtime Y N Date_____Time_____

	Safe	At-Risk	NA	Comments
1.0 Housekeeping				
1.1 Trash, scrap, (slag) disposed				
1.2 Spills and water are cleaned up as appropriate				
1.3 Work area is properly organized				
1.4 Walkways are clear and unobstructed				
1.5 Lines, leads, hoses properly routed				
2.0 PPE (Proper PPE and in good condition)				
2.1 Eye and Face Protection				
2.2 Hand Protection				
2.3 Hearing Protection				
2.4 Hard hat				
2.5 Shoes and Clothing				
2.6 Respirators				
2.7 Other (knee pads, leathers)				
3.0 Body Use and Positioning				
3.1 Proper lifting techniques, gets help if needed				
3.2 Proper body mechanics used (proper position, stable footing, bends knees, stretches)				
3.3 Walking/Climbing				
3.4 Line of Fire/Pinch Points				
4.0 Environment				
4.1 Proper ventilation available				
4.2 Proper lighting				
4.3 Safe access and escape routes				
4.4 Emergency equipment available (fire bottles)				
4.5 Warning signs posted if required				
5.0 Tool Selection and Use				
5.1 All tools required for the job				
5.2 Proper certification for tools being used				
5.3 Tools used properly (including hook-up)				
5.4 Tools in good working condition				
5.5 Protection of tools/equipment				
6.0 Fall Protection				
6.1 Ladders (secured and used properly)				
6.2 Scaffolding (not altered, guardrails, toeboards)				
6.3 All holes guarded or covered				
6.4 Safety harness used when necessary				
6.5 Aluminum bolt-on 2 steps properly secured				

*Please explain in detail on the reverse of this form.

COMMENTS

After completing your observation & feedback, summarize the observation and feedback session below. Please clearly explain any SIG follow-up items AND explain why you interrupted the observation, if applicable. Comments about environment: wind, rain, hot temperatures, additional training needed, etc.

COACHING TIPS

Focus on the employee's Work Practice's
Focus on working safely, NOT on safety rules
Provide positive feedback FIRST
Offer corrective feedback NEXT
Express concern for employee's safety
Be respectful of employee
Raise issues, don't criticize
Don't argue
Talk with, not AT the employee
Use "at-risk" not "unsafe"

NASSCO ASSEMBLY OBSERVATION SHEET
DEFINITIONS

1.0 Housekeeping (Safety Manual Reference 3.7 CH#5)

1.1 Trash, scrap (slag) disposed of
- Hazardous material is in proper container and correctly identified

1.2 Spills and water are cleaned up as appropriate
- There are no oily or slippery substances on the floor
- Water is cleaned up appropriately for the work area

1.3 Material is properly organized
- Material is neatly stacked when not in use

1.4 Walkways are clear and identified
- Scaffold and staging are considered walkways

1.5 Lines, leads hoses properly routed
- Does not pose a trip hazard

2.0 PPE - Proper PPE and in good condition (Section 4.2V.C CH#5)

2.1 Eye and Face protection
- Only NASSCO approved Industrial Safety Glasses authorized
- Welding hoods, face shields to be worn properly and in good condition

2.2 Hand Protection (Section 4.3.V.C CH#5)
- Hand protection is appropriate to type of work
- Gloves are not to be worn when operating drills, punch presses, pedestal grinders, or other machines where the hand may be caught

2.3 Hearing Protection
- Hearing protection is worn in construction/assembly/shop areas
- Ear plugs are properly inserted in ears

2.4 Hard Hat
- Section 4.3 CH#5 notes where hard hats are mandatory or recommended
- Liner inserted in helmet correctly

2.5 Shoes and Clothing
- All leather shoes
- Heels at least 1/4 inch, no higher than 1-3/4 inch in height
- Long sleeves required while doing hot work
    - Clothing is not tattered
    - No cuffs on trousers

2.6 Respirators
- Employee is clean shaven
- Respirator is maintained in a clean condition
- Respirator is properly stored when not in use in a sealed plastic bag, not stored underneath tool bags or equipment

2.7 Other
- Knee pads used where advisable
- Leathers needed for overhead hot work

3.0 Body Use and Positioning (Section 3.2.II CH#5)

3.1 Proper lifting techniques used, gets help when needed
- Uses "power" grip to grasp objects
- Maintains a neutral or straight alignment of the wrists
- Bends at the knees and keeps back straight
- Holds objects close to their body
- Lifts with both legs and steps in direction of travel or load placement
- Does not turn or twist at the knees or lower back
- Gets help when the object is too heavy or too awkward for one person
- Does not carry heavy loads up or down ladders

3.2 Proper body mechanics used (proper positions, stable footing, bends knees, stretches)

3.3 Walking/Climbing
- Looks in direction they are walking and holds handrails when using stairs or ladders

NASSCO ASSEMBLY OBSERVATION SHEET
DEFINITIONS

3.4 Line of Fire/Pinch Points
- Avoids placing themselves between any moving equipment or under suspended loads
- Keeps hands and fingers away from areas where they can get caught between moving parts

4.0 Environment

4.1 Proper ventilation available and used correctly
- Size of vent hose is appropriate for the work being performed
- Exhaust ducting is attached directly to exhaust manifold
- Exhaust vent clear of debris and trash so as not to obstruct air flow
- 3 inch scoop used for arc welding, burning, or cutting when appropriate
- Employee keeps vent nozzle close to welding or burning operation

4.2 Proper lighting
- Area lighted so as to minimize shadows
- Temporary lighting sufficient and of correct type

4.3 Safe access and escape routes
- Employee knows escape route in the event of an emergency

4.4 Emergency equipment available (fire bottles)
- Ensure that a CO2 bottle is not being used in a confined space
- Employee knows location of nearest fire bottle station
- Employee knows how to use the fire bottle correctly

4.5 Warning signs posted if required
- Employee has taken appropriate action to protect themselves and others of hazardous conditions by posting signs, barricades and making appropriate notifications

5.0 Tool Selection and Use

5.1 All tools required per tradesmen's list
- Ensure tools listed on trades requirement trade list are available

5.2 Proper certification for tools being used
- Certification is valid for equipment being operated and still within the expiration date

5.3 Tools used properly (including hook up)
- All Chicago couplings have safety wire or clips
- Proper tool is being used for the task being done

5.4 Tools in good working condition
- Come-alongs have safety latch installed , hook not spread

5.5 Protection of tools/equipment
- Return to tool room when not being used for the job

6.0 Fall Protection (Section 3.1.II CH#5)

6.1 Ladders secured and used properly
- Ladder is not damaged
- Ladder is correct length for work involved
- Ladder is slanted at about a 75 degree angle (base is 1/4 of the ladder length from the wall)
- Stepladder is free standing and not tied off
- Employee is not standing or sitting on top two steps of ladder

6.2 Scaffolding (not altered, guardrails, toeboards)
- Guardrails, toeboards required when work area is more than 5 feet above the ground
- Erection, alteration and dismantling of scaffold must be performed by competent and qualified scaffold persons
- Top rail 42 inches high with a mid-rail half way between top and bottom rail

6.3 All holes guarded or covered
- Holes guarded, barricade in place
- If barricade is impractical then opening must be covered using a minimum of 3/4 inch plywood that is at least 10% larger than the opening

6.4 Safety harness used when necessary
- Harness is correctly worn by employee
- Harness is attached to a fixed point by use of a lanyard

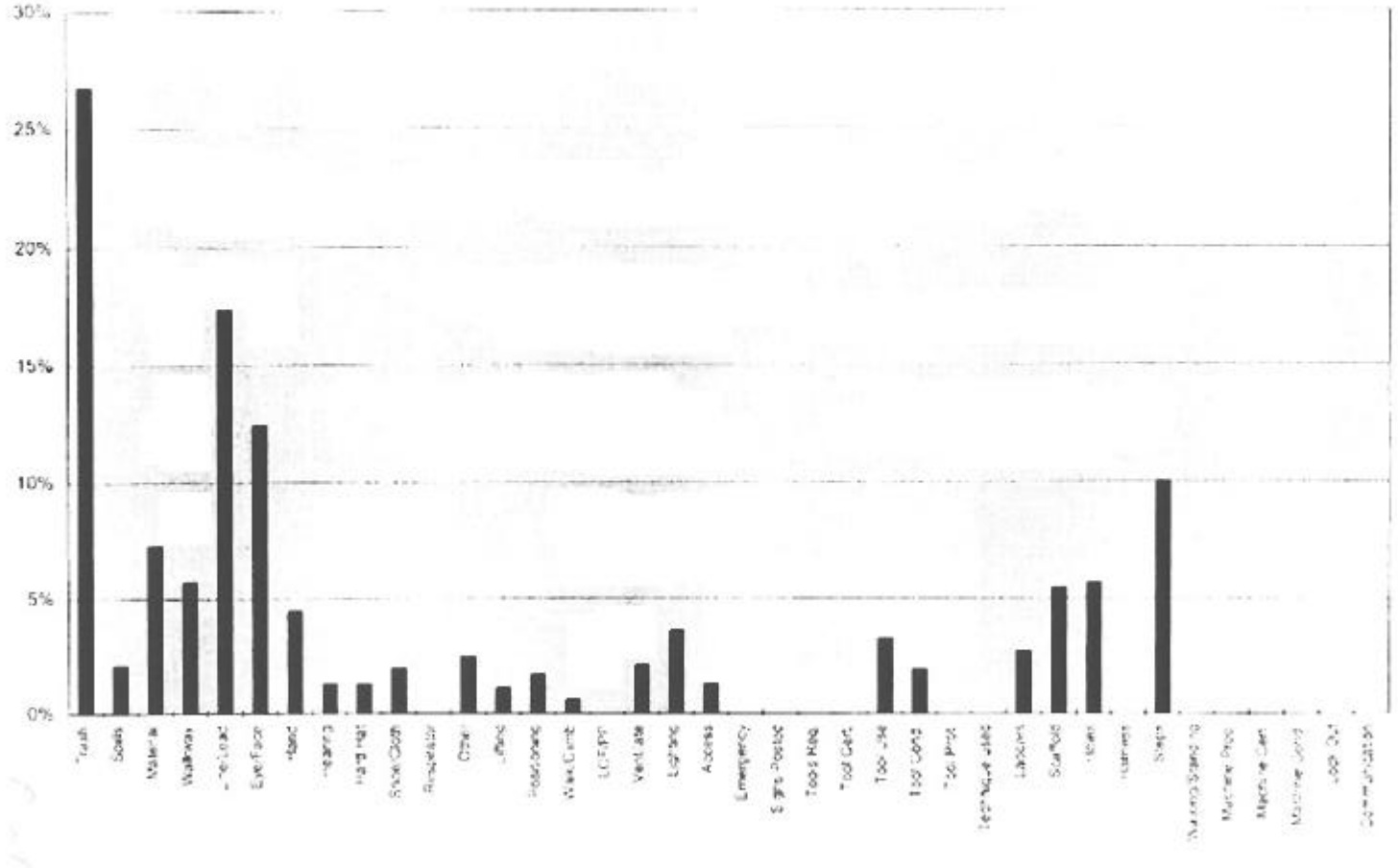
6.5 Aluminum bolt-on 2 steps properly secured
- Step is positioned properly and bolts tightened

ASSEMBLY DEPARTMENT

		Week # 28				Yearly Cumulative			
	Category	Safe	At-Risk	NA	% Risk	Safe	At-Risk	NA	% Risk
1.1	Trash	115	42	3	27%	2555	1198	46	24%
1.2	Spills	141	3	14	2%	3087	104	488	2%
1.3	Material	140	11	6	7%	3282	391	34	8%
1.4	Walkway	148	9	0	6%	3438	220	31	4%
1.5	Line/Lead	143	30	5	17%	2936	865	48	18%
2.1	Eye/Face	134	19	1	12%	3023	673	83	14%
2.2	Hand	150	7	0	4%	3572	117	11	2%
2.3	Hearing	151	2	0	1%	3573	87	9	2%
2.4	Hard Hat	154	2	0	1%	3642	15	6	0%
2.5	Shoe/Cloth	150	3	1	2%	3491	154	15	3%
2.6	Reespiralor	55	0	97	0%	1127	38	2518	1%
2.7	Other	120	3	32	2%	2505	211	934	4%
3.1	Lifting	175	2	10	1%	3763	23	397	0%
3.2	Positioning	174	3	1	2%	3860	41	32	1%
3.3	Walk/Climb	161	1	0	1%	3661	42	39	1%
3.4	LOF/PP	133	0	21	0%	2979	21	831	0%
4.1	Ventilate	93	2	56	2%	2021	34	1754	1%
4.2	Lighting	134	5	14	4%	2986	109	574	2%
4.3	Access	151	2	0	1%	3508	44	94	1%
4.4	Emergency	151	0	1	0%	3533	31	72	1%
4.5	Signs Posted	116	0	40	0%	2367	20	1244	0%
5.1	Tools Req.	154	0	0	0%	3624	21	20	0%
5.2	Tool Cert.	153	0	3	0%	3507	6	140	0%
5.3	Tool Use	149	5	1	3%	3544	71	40	1%
5.4	Tool Cond.	153	3	0	2%	3597	45	16	1%
5.5	Tool Prot.	154	0	0	0%	3580	14	45	0%
5.6	Technique used	0	0	0	#DIV/0!	48	1	1551	0%
6.1	Ladders	72	2	83	3%	1563	62	2058	1%
6.2	Scaffold	52	3	99	5%	1172	86	2380	2%
6.3	Holes	50	3	104	6%	1083	101	2467	2%
6.4	Harness	17	0	131	0%	375	20	3232	0%
6.5	Steps	27	3	127	10%	532	34	3061	1%
6.6	Walking/Standing	0	0	0	#DIV/0!	16	0	1601	0%
7.1	Machine Proc.	0	0	0	#DIV/0!	26	0	1591	0%
7.2	Machine Cert.	0	0	0	#DIV/0!	26	0	1591	0%
7.3	Machine Cond.	0	0	0	#DIV/0!	27	0	1590	0%
7.4	Lock Out	0	0	0	#DIV/0!	1	0	1616	0%
8.1	Communication	0	0	0	#DIV/0!	45	0	1573	0%
			165				4899		

Assembly Department
Week 28

% At-Risk



Assembly Supervisor Survey

Survey Title:
Assembly Supervisor TSC Survey

Administered To:
Assy Supervisor Survey
Aug 26, 1998

Assembly Supervisor Survey

Administered To: Assy Supervisor Survey — Date Administered: Aug 26, 1998

Main Report Section

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I have a good understanding of the main ideas of Total Safety Culture.		0.0	7.7	0.0	69.2	23.1
	n = 13	Mean: 4.08/5	SD: 0.76	Mode: 4/5		
2. I believe that TSC, if done right, could improve safety at NASSCO.		0.0	0.0	7.7	61.5	30.8
	n = 13	Mean: 4.23/5	SD: 0.60	Mode: 4/5		
3. In fact, I think that TSC has improved our safety already.		0.0	15.4	15.4	53.8	15.4
	n = 13	Mean: 3.69/5	SD: 0.95	Mode: 4/5		
4. I have a hard time doing daily observations. (R)		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
		15.4	46.2	30.8	7.7	0.0
	n = 13	Mean: 2.31/5	SD: 0.85	Mode: 2/5		
5. I enjoy doing the observations because I can talk to my employees about safety.		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
		7.7	15.4	38.5	30.8	7.7
	n = 13	Mean: 3.15/5	SD: 1.03	Mode: 3/5		
6. I think the observation and feedback process has helped me develop trust with my employees.		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
		15.4	15.4	15.4	53.8	0.0
	n = 13	Mean: 3.08/5	SD: 1.19	Mode: 4/5		

Results reported in a percent scale — (R) = Reversed Scoring — Rank based on: Descriptive Mean

Assembly Supervisor Survey

Administered To: Assy Supervisor Survey | Date Administered: Aug 26, 1998

Main Report Section

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
7. The observation and feedback process has helped identify and fix safety hazards in our work area.	7.7	7.7	7.7	76.9	0.0
n = 13	Mean: 3.54/5	SD: 0.97	Mode: 4/5		

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
8. I would do more observations if I received some type of recognition for doing them.	46.2	15.4	15.4	7.7	15.4
n = 13	Mean: 2.31/5	SD: 1.55	Mode: 1/5		

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
9. Most employees support TSC and appreciate being observed.	15.4	0.0	38.5	46.2	0.0
n = 13	Mean: 3.15/5	SD: 1.07	Mode: 4/5		

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
10. Employees respond well to the feedback I give them.	0.0	23.1	7.7	53.8	15.4
n = 13	Mean: 3.62/5	SD: 1.04	Mode: 4/5		

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11. The observation sheet is very helpful and easy to use.	0.0	0.0	23.1	61.5	15.4
n = 13	Mean: 3.92/5	SD: 0.64	Mode: 4/5		

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
12. I think management is providing adequate support for TSC to be successful.	7.7	30.8	30.8	23.1	7.7
n = 13	Mean: 2.92/5	SD: 1.12	Mode: */5		

Assembly Supervisor Survey

Administered To: Assy Supervisor Survey — Date Administered: Aug 26, 1998

Main Report Section

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
13. Management still focuses on the wrong things and punishes people for injuries. (R)		15.4	30.8	23.1	23.1	7.7
	n = 13	Mean: 2.77/5	SD: 1.24	Mode: 2/5		
14. Employees are starting to give each other feedback about at-risk behaviors.		0.0	0.0	23.1	69.2	7.7
	n = 13	Mean: 3.85/5	SD: 0.55	Mode: 4/5		
15. I really don't have time to do an observation daily. (R)		15.4	61.5	7.7	7.7	7.7
	n = 13	Mean: 2.31/5	SD: 1.11	Mode: 2/5		
16. I don't usually hear about what the SIG team is working on. (R)		15.4	30.8	15.4	15.4	23.1
	n = 13	Mean: 3.00/5	SD: 1.47	Mode: 2/5		
17. Most employees don't know what the SIG team does. (R)		15.4	15.4	15.4	30.8	23.1
	n = 13	Mean: 3.31/5	SD: 1.44	Mode: 4/5		

Results reported in a percent scale — (R) = Reversed Scoring — Rank based on: Descriptive Mean